

Brown Pelican Stranding Event of Fall-Winter 2008-09 in the North Eastern Pacific



Preliminary status report 1/20/09

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Brown Pelican Fall-Winter 2008-09 Stranding Event in the Eastern Pacific

Introduction

The stranding and deaths of large numbers of brown pelicans (*Pelecanus occidentalis*) beginning in mid-December 2008 has resulted in considerable concern and speculation as to cause(s) and implications for species recovery. The purpose of this interim report is to provide the Resources Agency, California Department of Fish and Game, and Fish and Game Commission with an initial assessment, recognizing that final and complete determination of population status, cause(s) of death, behavioral anomalies and outcomes for living birds could take weeks to months. The final report, which will be compiled at a later date, will contain more definitive and additional information and may contain some differing ideas or conclusions.

Brown Pelican (BRPE) Natural History Observations and Time Line

As BRPE populations have recovered and slowly increased over the last two decades, increased numbers have begun occupying the northern extremes of their summer habitat in the Pacific Northwest. Below is a timeline of observations (originating from various avian experts, including Ms. Debra Jaques, Dr. Dan Anderson, Ms. Elizabeth Philips) regarding this phenomenon and the subsequent stranding event(s).

September 2008: Record high numbers (12,000) of BRPE were counted on East Sand Island in the Columbia River and record numbers recorded on the Southeast Farrallon Islands. Surveys from California to Washington reveal 17,000 BRPE, up from 4,800 in 1988.

November 24, 2008: 5,000 BRPE were observed at Sand Island, with some going into breeding plumage.

Week of December 10: Ice storms and subfreezing weather hit Seattle and Portland areas and continued for several weeks with record low temperatures. Several thousand pelicans were believed to have departed the Columbia River mouth region during the period **December 10-15**. Other observations during **December 13-14** report “hundreds” of pelicans moving north towards the Columbia River and into East Sand Island. In past years, northern California biologists have reported large flocks of BRPE moving southward during the late fall following winter storms.

December 19: Beginning at this time, larger than normal numbers of BRPE began stranding in San Francisco Bay and Monterey Bay (SF/MB) areas. From December 19 to January 11, the total number of live birds was 60-70 (final numbers of birds are not yet available).

December 27-28: Beginning at this time, larger than normal numbers of BRPE were picked up by rehabilitation organizations in Los Angeles/Long Beach (LA/LB) areas. From December 27 to January 11 the total was about 70.

December 25-January 11: Wildlife rehabilitators and biologists in Morro Bay reported a mild to moderate increase in stranded and beached birds, but no major die-off for the period. Similarly, Sea World of San Diego reported a mild to moderate increase in stranded birds and no major die-off for the period

Clinical Observations on Stranded Pelicans



SF/MB areas: Stranded BRPE began to be picked up just before Christmas in larger than normal numbers. Total from December 19 to January 11 brought to International Bird Rescue Research Center (IBRRC) in Cordelia, California (picture above from January 15, 2009 *New York Times*) was 60-70. Body condition ranged from very poor to normal, and a significant percentage (75%) were adult birds (versus normal “winter kills” involving mainly young of the year). A few (less than 10) from the Monterey Bay area were reported to be wet and have some sort of sticky, oily and fishy material caking their feathers. A few (5-6) had fishing gear entanglement and other injuries. Several live and several dead had observable pathological lesions; blistered or bruised looking feet and pouches, necrotic toe webs or dry gangrene of the toes, suggestive of frostbite.

LA/LB areas: Beginning just after Christmas greater than normal numbers of BRPE were picked up by rehabilitation organizations in LA/LB, with many going to the LA IBRRC and Huntington Beach Wetlands and Wildlife facilities. The total from December 27 to January 11 at IBRRC in LA was about 60, again with a higher than expected proportion adult birds. Many had lesions that resembled frostbite on toes and pouches, some of which were quite severe. Two had domoic acid (DA) levels in blood that might produce intoxication, but there is no known diatom bloom activity that might produce DA, nor other species exhibiting intoxication.

Clinical findings: Anemia has been a fairly common finding in BRPE coming in for rehabilitation. Of BRPE examined at IBRRC in Cordelia, mean packed cell volume (PCV) data showed a distinct bimodal distribution, suggesting two distinct patient populations. Forty percent of these pelicans had PCV's at 40% or greater (within normal range), about 42% had PCV's of 30% or less (abnormally low), and the remaining 18% were between 30 and 40%. Findings at LA/LB were overall lower with a mean PCV of 21% (n=31), with only 2 of the 31 having a PCV of 40% or greater. Several pathologists have noted that lungs appeared hypo-perfused, another sign of anemia.

Behavior: Depression and abnormal behavior (potential signs of central nervous system damage) had been reported for a number of birds. These signs did not include seizures characteristic of toxic or infectious encephalitis, or involuntary and repetitive pouch scratching frequently reported in pelicans with DA toxicity. Most BRPE in rehabilitation are responding to supportive care, warming, supplemental nutrition, fluid replacement and rest. This observation would seem to support the concept that signs of depression, strange behavior and inability to move were more likely the result of exhaustion, hypothermia and/or hypoglycemia versus central nervous system damage due to toxin or virus as had been speculated.

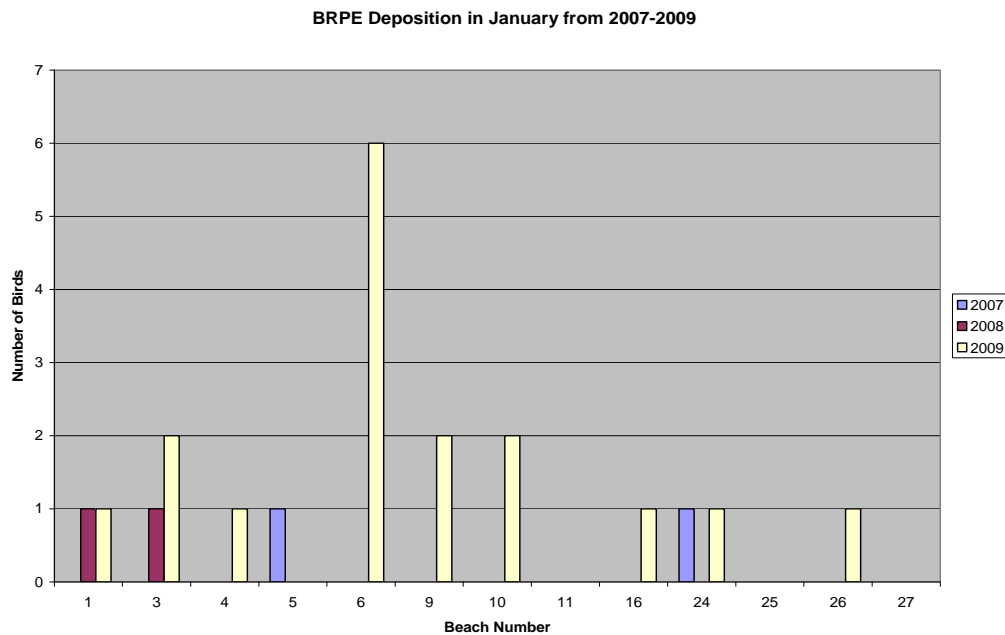
Body Condition: Starvation has not been seen as a primary finding as commonly in this set of BRPE as during previous winter pelican wrecks (in which 75-80% of birds exhibited low body weights). For example, only 5 of the 31 (16%) at IBRRC in Cordelia between December 27 and January 8 weighed less than 2600 grams (normal body weight is about 3500-5000 grams). This is another indication of two distinct patient populations. It should be noted that malnutrition/starvation findings make up a higher proportion of dead BRPE presented for postmortem examination, and that also is to be expected. In wild populations those in worst nutritional condition are those that die most frequently.

Interpretation of Frostbite: In both SF/MB and LA/LB a significant number of both live and dead BRPE have injuries that look like frostbite, some quite severe, mostly on the toes, foot webs and pouches. This strongly suggests that pelicans in treatment are primarily those from Oregon, as the December freezing temperatures along or near the ocean did not extend down into California. (below, severe necrosis of the toes and webs, photo by Dr. Leslie Woods of CAHFS)



Standardized Beach Carcass Surveys

The Monterey Bay National Marine Sanctuaries have historically conducted standardized species specific beached carcass surveys. This allows an independent and verifiable count of dead birds for year to year comparison, and has served as a good method to verify when mortality events like oil spills exceed baselines. Comparison of 2007, 2008 and 2009 carcass survey data for the beaches within Monterey Bay are shown below. What is clearly evident is that the number of dead pelicans for the month of January so far has been about double the last two years. (C. Gibble of MLML and CDFG)



Pathology and Laboratory Findings

Four diagnostic laboratories ([California Animal Health & Food Safety Laboratory System](#) (CAHFS) at UC Davis, the US Geological Survey National Wildlife Health Center, Sea World San Diego, and CDFG's Marine Wildlife Veterinary Care and Research Center (MWVCRC) in Santa Cruz) received and analyzed dead BRPE and their tissues in December and January. Three research or state laboratories (Dr. Dave Caron's lab at University of Southern California, and CDFG's Wildlife Investigations Lab (WIL) and Water Pollution Control Lab (WPCL)) also have been involved in receiving and analyzing samples for toxins, oils and other contaminants. Only preliminary findings are available at this time.

Gross pathology and laboratory analyses take days to weeks to complete, so findings at the time of this preliminary report are limited. Initial pathology findings are variable; therefore the focus of this interim report will be on common findings. Of the 12 pelicans initially examined (three at each of the four diagnostic labs), eight were malnourished to the point that starvation either caused or contributed to their death. Seven had recognizable frostbite injuries. Several of the birds exhibited signs of infections, infestations and/or intoxications, of varying severity, including hepatitis, pancreatitis, endocarditis, bronchitis and enteritis and evidence of reduced immune system function.

Of an additional 7 pelicans receiving only gross examination at the MWVCRC shortly before this report, four were moderately (picture below by C. Gobble) or severely malnourished and three were in good to excellent body condition (these individuals died as a result of overheating during transport), again supporting the concept that there have been two distinct patient populations. At the time of this report, an additional 3 fresh BRPE were in shipment to the CAHFS laboratory for examination by veterinary pathologists. These examinations should complete the disease investigations.

To date none of these pelicans have shown lesions compatible with **Avian Influenza (AI)**, **West Nile** or **Newcastle disease**, and those that have been tested for AI have been negative. Lesions or laboratory findings suggestive of **botulism**, **avian cholera**, or **salmonella** have not been identified. At this point in time, it does not appear that any serious or consistently identified infectious disease, currently understood to cause population level mortality or illness in BRPE, is the primary cause of this stranding and mortality event.

Regarding data on domoic acid (DA), although full laboratory findings are still pending on most birds, Dr. Carons's lab measured 1-2 ng/ml DA in the blood of four of 19 BRPE, with other BRPE having undetectable levels. These levels are an order of magnitude below levels previously detected in pelicans during a red tide event and two orders of magnitude below maximal levels seen previously in BRPE. DA was non detectable in cloacal contents of three pelicans examined at CAHFS,.

Colony and Other Counts of the Living BRPE Population

At the present time, CDFG in cooperation with other agencies and researchers, is attempting to design and implement aerial and/or ground count(s) of BRPE in California. This approach will provide a second independent measure of brown pelican population health and distribution. It will also help determine whether the current stranding and mortality event has population recovery implications. If ground counts are made, observation for signs of illness and injury can be verified or excluded in BRPE that have not stranded.

Summary

IBRRC has estimated statewide numbers of stranded and dead brown pelicans to be 300-400. Available information corroborates this range, and suggests this may be an underestimate. Approximately 75% of these were alive when captured for diagnosis, care and rehabilitation in the roughly six weeks between December 18, 2008 and the issuance of this report. Many are still in care and survival rates are not available at this time.

The primary cause(s) of this brown pelican stranding and mortality event appear to be weather and migration related, but this does not necessarily explain all observations and findings. It should be noted that full pathology and laboratory support findings are incomplete. Several other diseases, none of them suggestive of a widespread problem, have been identified in these BRPE. Malnutrition and weather related stresses could contribute to increased susceptibility to infectious diseases or could mobilize fat soluble toxicants, including mercury, DDT and PCB's. Some laboratory results suggest that a few birds may have ingested the biotoxin DA, but evidence for a significant or widespread harmful algal bloom is lacking at this time. Although it occurred suddenly, and affected pelicans showed some unusual signs, the magnitude of the current wreck is in line with previous winter storm driven BRPE wrecks, particularly given the increasing size of the Eastern Pacific population.

Comment: Biologists, wildlife rehabilitators, veterinarians, researchers, pathologists, animal care personnel and the public at large have responded quickly, generously and very cooperatively in trying to deal with this pelican die off or wreck. The individuals involved were far too many to name, but the list of organizations below is an attempt to give credit and thanks; since doubtless some will be missed, apologies are offered in advance: International Bird Rescue Research Center(s) in Cordelia and Los Angeles, Wetlands and Wildlife Care Center of Huntington Beach, WildRescue, Wildlife Assist. Monterey County SPCA, Native Animal Rescue, Pacific Eco-Logic, Sea World-San Diego, California Animal Health and Food Safety Laboratory (CAHFS) at U.C. Davis and faculty in the Veterinary School and John Muir Institute, U.C. Davis-Wildlife Health Center-Oiled Wildlife Care Network, USGS National Wildlife Health Center, Moss Landing Marine Labs, University of Southern California, California Department of Public Health, and California Department of Fish and Game.